

POCUS

(Point of care ultrasound)

Thomas Baribeault MSN CRNA

Definitions

- Point-of-care ultrasound (POCUS) is defined as a goal-directed, bedside ultrasound examination performed by a healthcare provider to answer a specific diagnostic question or to guide performance of an invasive procedure.

Comparison

- Traditional
 - Comprehensive exam
 - Sonographer
 - Interpreted radiologist
- POCUS
 - Answers a clinical question
 - Performed and interpreted at bedside by treating clinician

Applications

- Procedures
 - Vascular access, peripheral nerve blocks, neuraxial, thoracentesis, pericardiocentesis, paracentesis, arthrocentesis

Applications

- Diagnosis
 - Heart
 - Pericardial effusion/Tamponade
 - Left ventricular ejection fraction
 - Diastolic dysfunction
 - Right ventricular strain
 - Aortic or mitral stenosis or regurgitation
 - Wall motion abnormalities

Applications

- Diagnosis
 - Lung
 - Pneumothorax
 - Pulmonary edema
 - Pulmonary effusion
 - Atelectasis
 - Pneumonia
 - Pulmonary embolism

Applications

- Diagnosis
 - IVC
 - CVP
 - Gastric
 - NPO status
 - Airway exam
 - Difficult airway
 - Vocal cord function
 - Intubation

Applications

- Monitoring
 - Resuscitation
 - CPR
 - FAST exam
 - Serialized exams
 - Pulmonary edema
 - Fluid resuscitation
 - Response to inotropes

Physics

- Piezoelectric crystals
 - Electricity applied to the crystals cause vibration creating ultrasound waves
 - Ultrasound waves returning to the crystals cause vibration creating an electrical signal
 - 1% sending, 99% listening

Physics

- Frequency
 - Human hearing 20-20,000Hz
 - Ultrasound 1-15 MHz (1,000,000-15,000,000)
 - Higher frequency = better resolution
 - Lower frequency = better penetration

Physics

- Wave propagation
 - Reflection
 - Maximized when beam and object is perpendicular
 - Attenuation
 - Signal is lost
 - Refraction, scatter, and absorption
 - Hyperechoic, hypoechoic, and anechoic

Probeology

- Types
 - Linear
 - 8-13 MHz
 - Curvilinear
 - 2-5 MHz
 - Wider field of view
 - Phased Array “cardiac”
 - 1-5 MHz

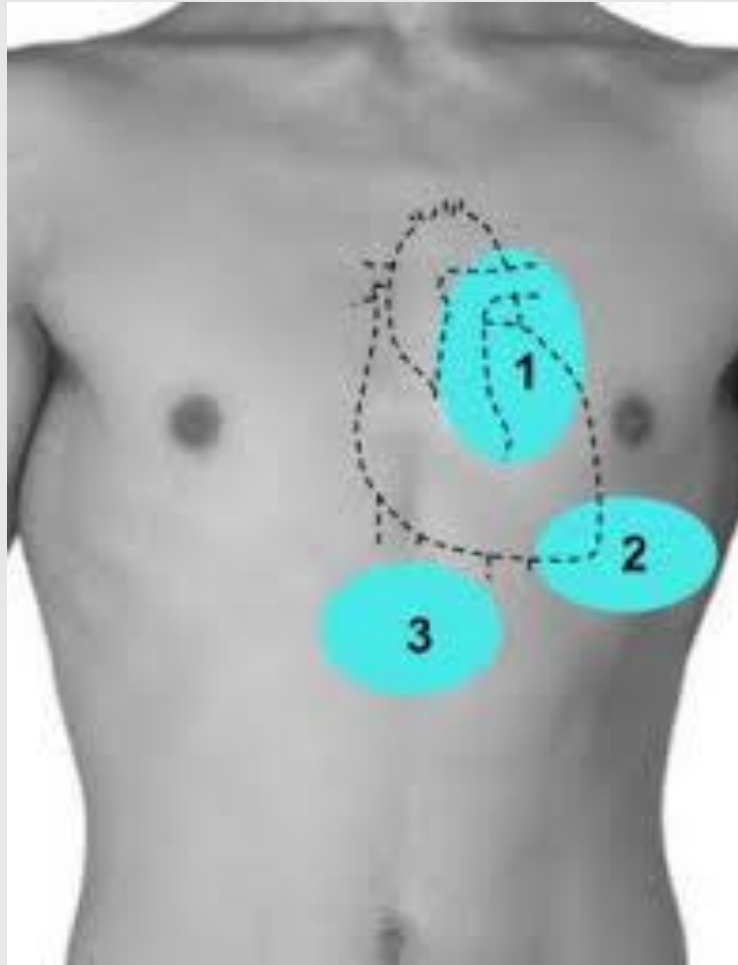
Probeology



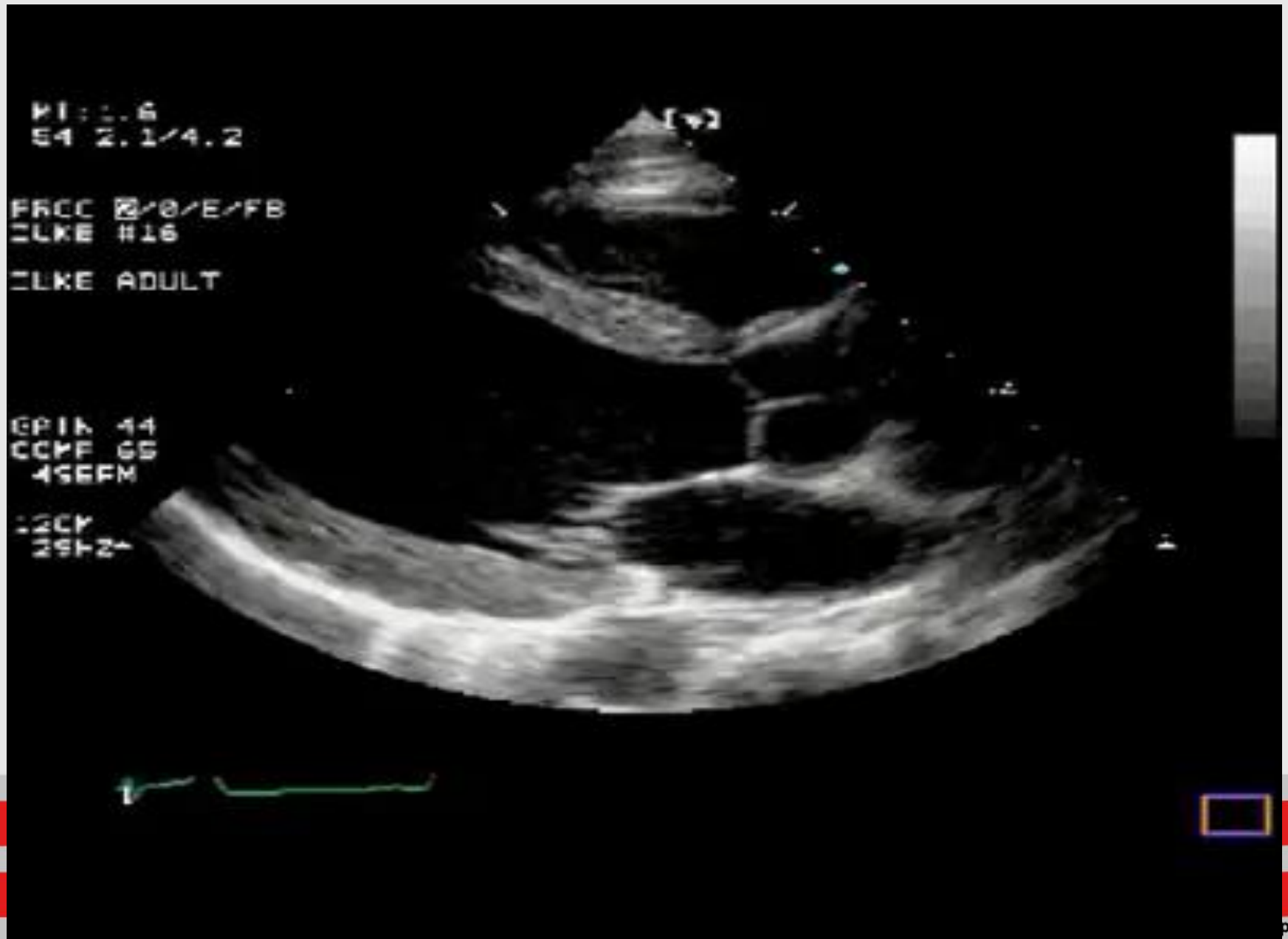
Heart

- Windows/Views
 - Parasternal
 - Long axis
 - Short axis
 - Apical
 - 4 chamber
 - Subcostal
 - 4 chamber
 - IVC

Heart



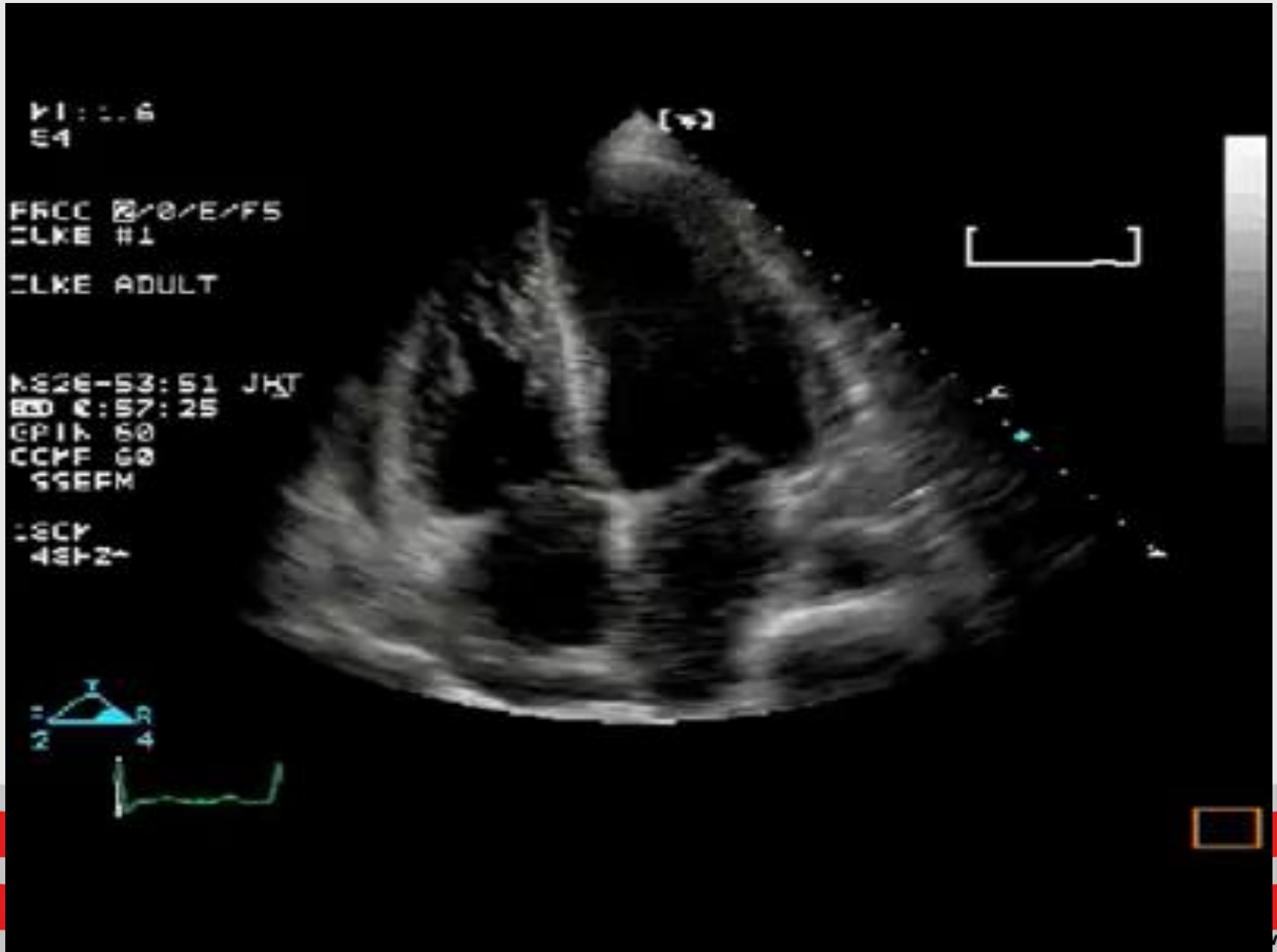
PLAX



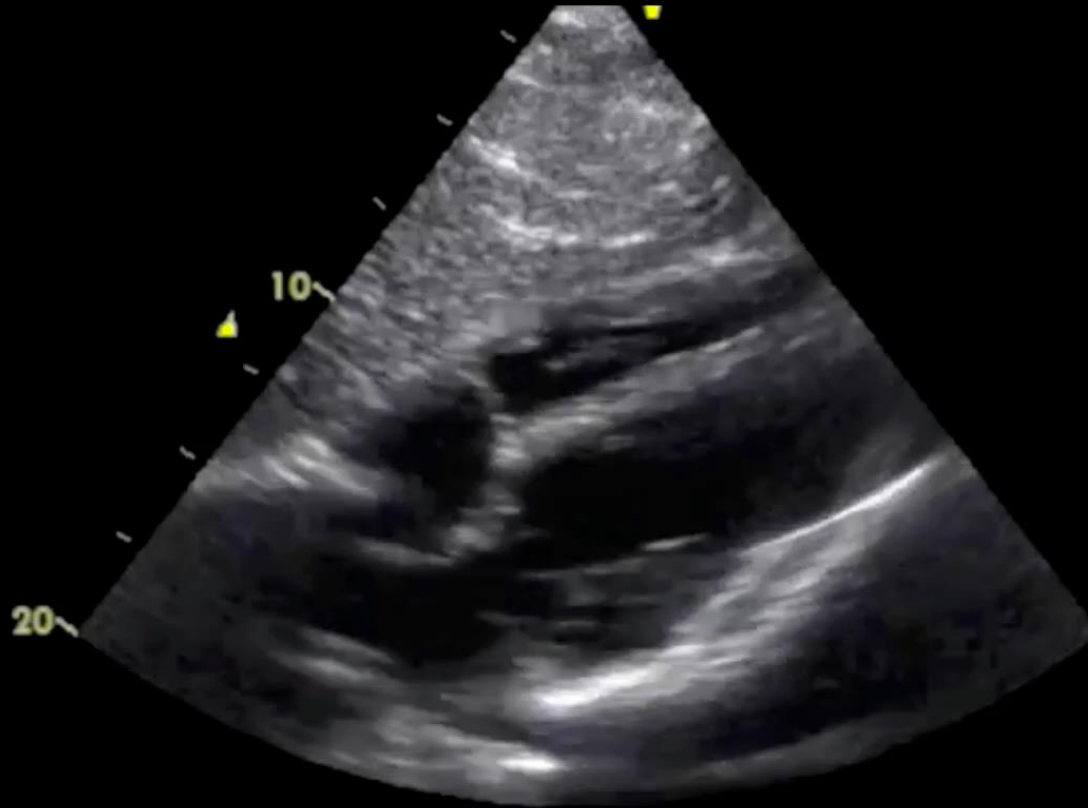
PSAX



A4C



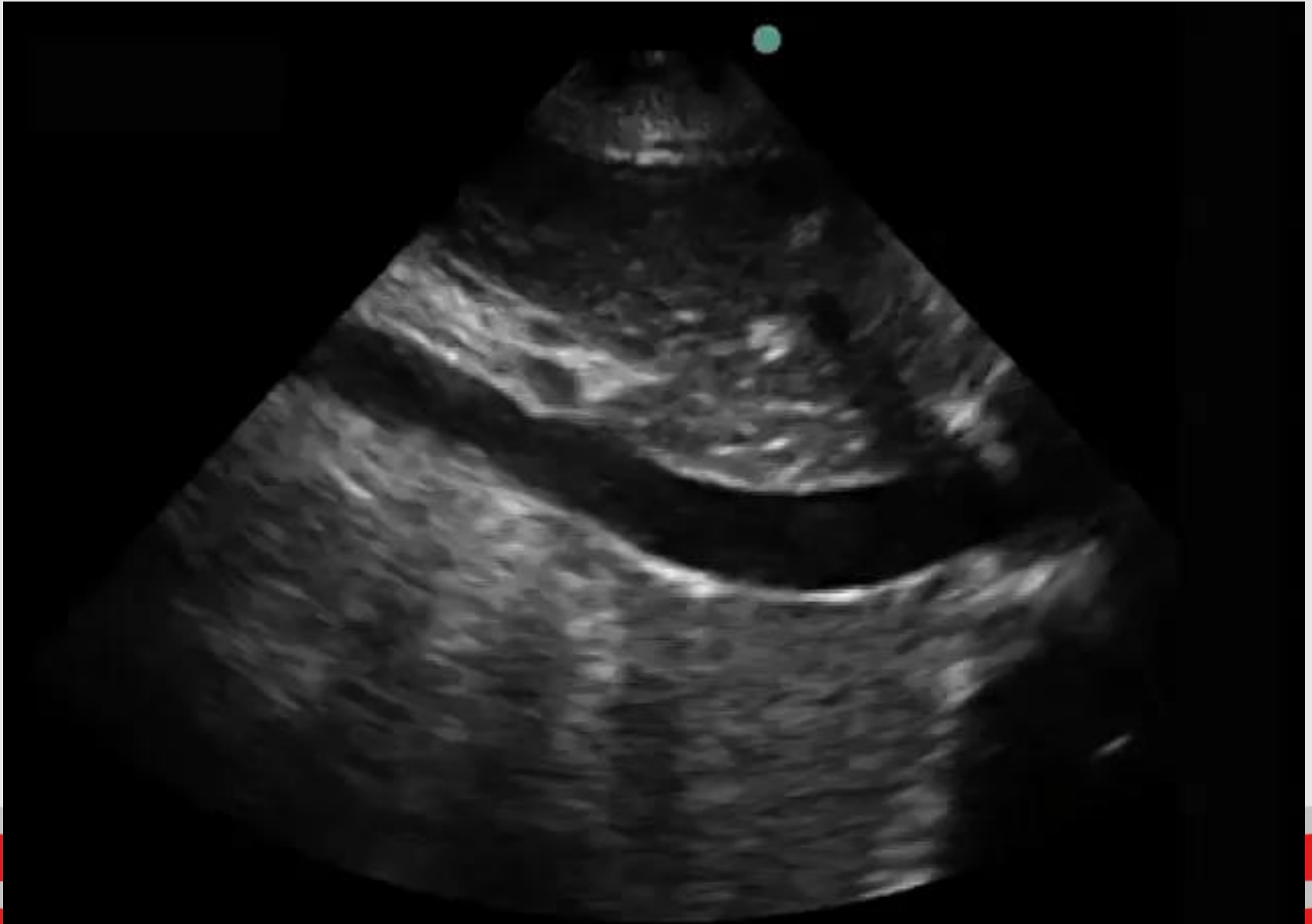
S4C



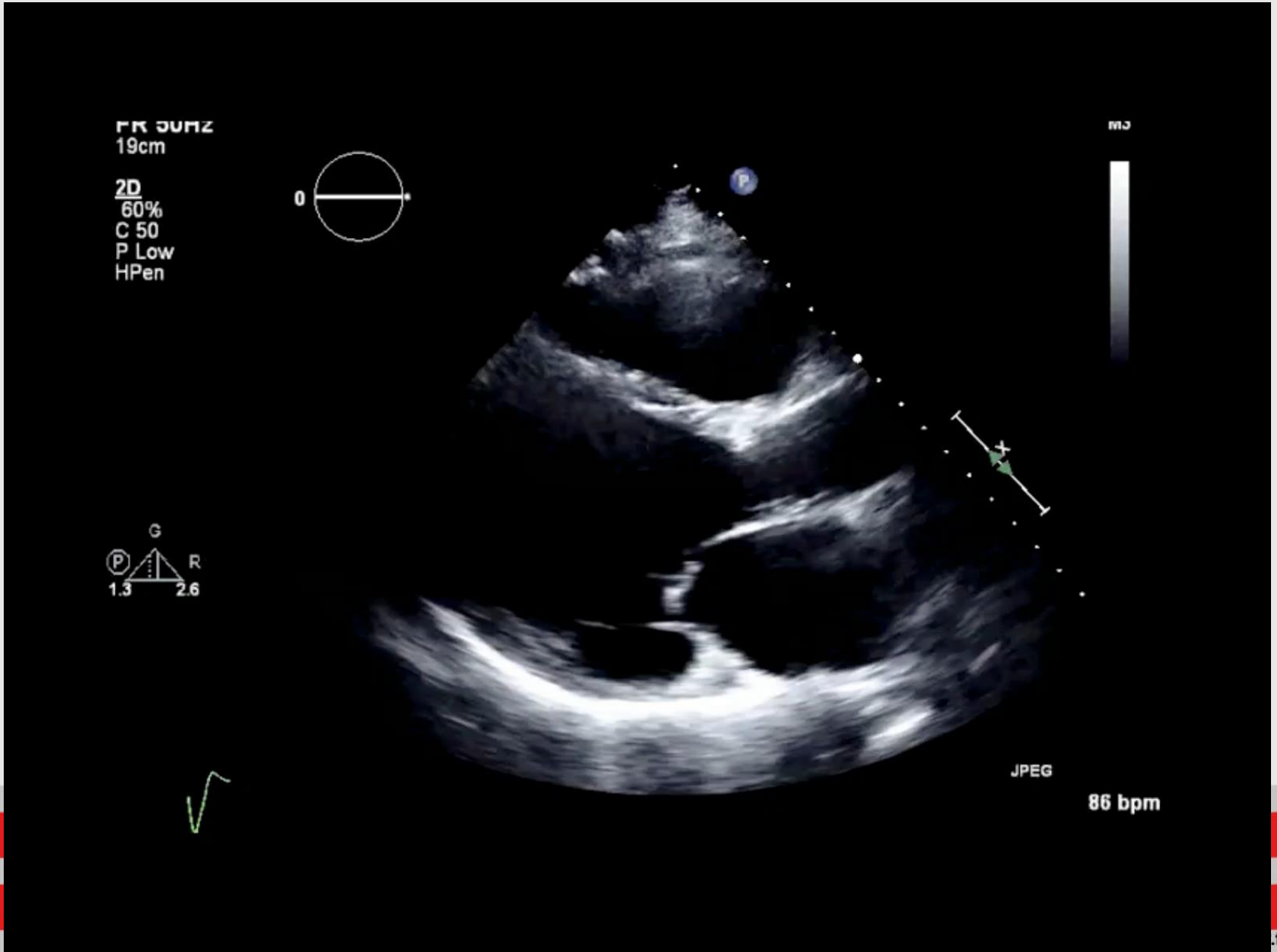
ICMteaching.com



SIVC




Low EF



Pericardial Effusion

SonoScape Clinique Naoufel admin 2P1 MI 1.1 TIS 1.5
150701110217587 Bendaouad Karima 36 ans Jul - 1-2015 11:06:51

FPS 40
D/G 220/6
GN 41
I/P 1/0
PWR 80
FRQ 3.2- 5
D 16.4cm



0 5 10 15

0 290

DR BOUARROUDJ NOREDDINE

.fppt.info

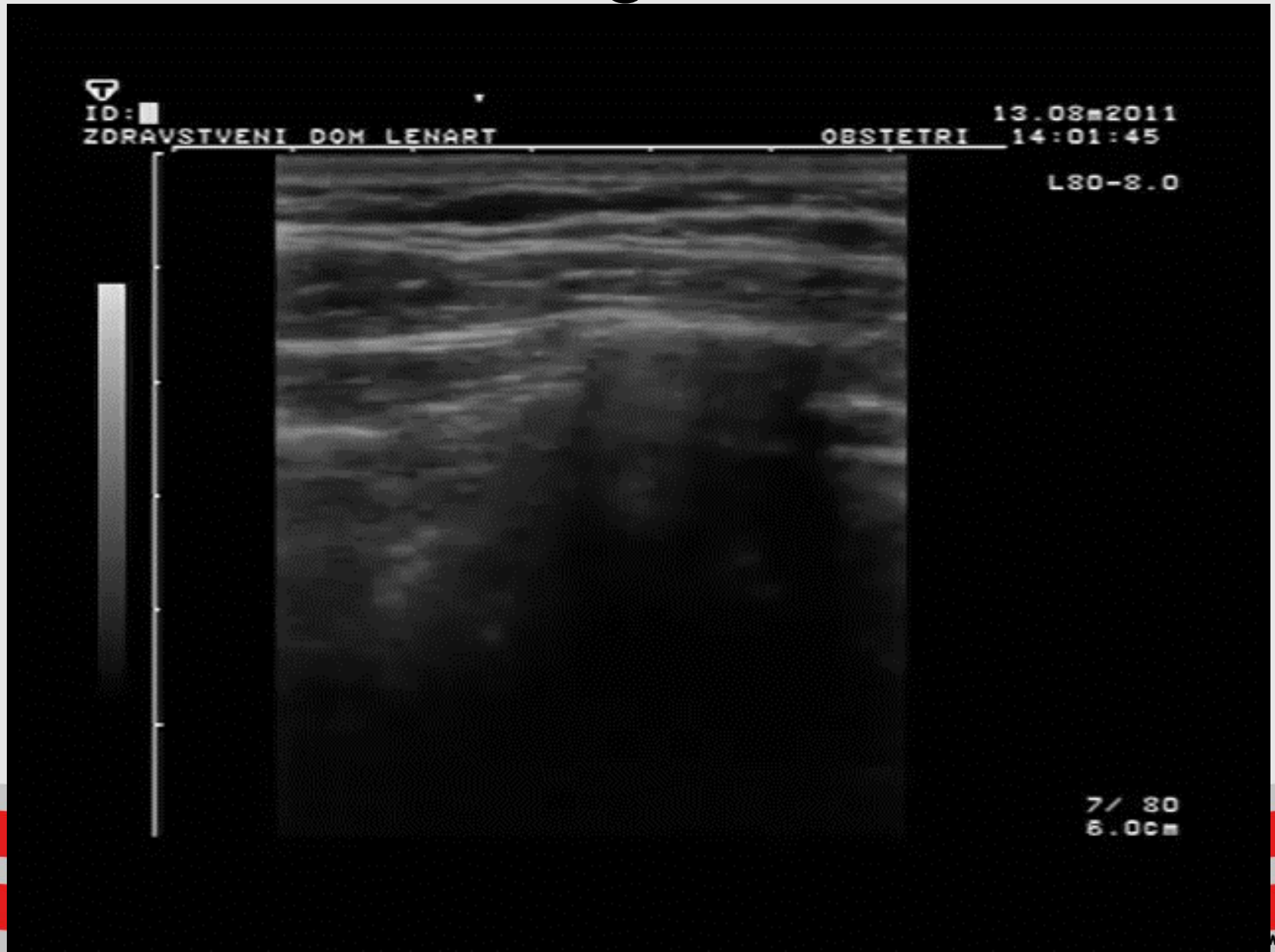
IVC Collapse



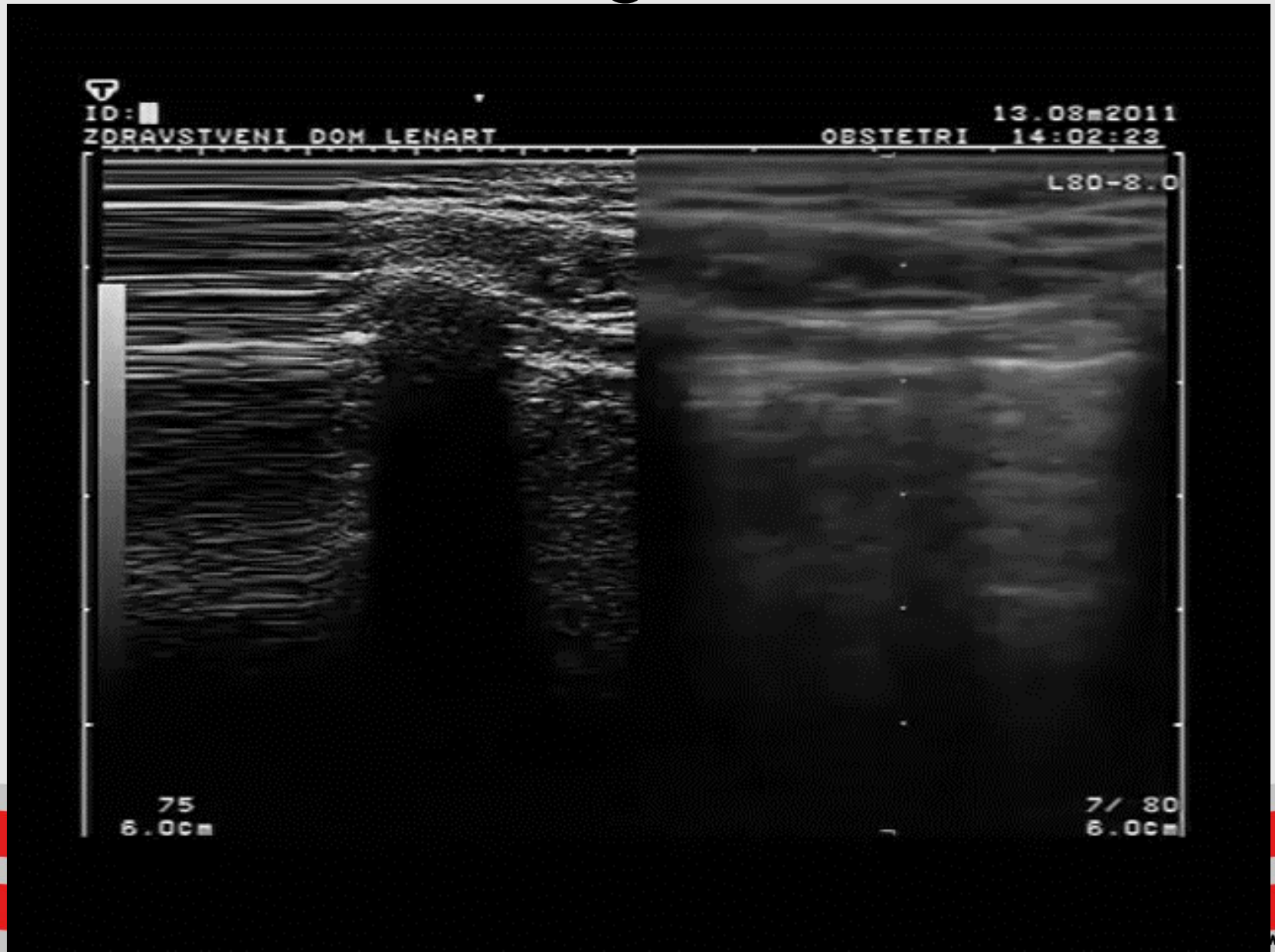
Lung U/S



Lung U/S



Lung U/S



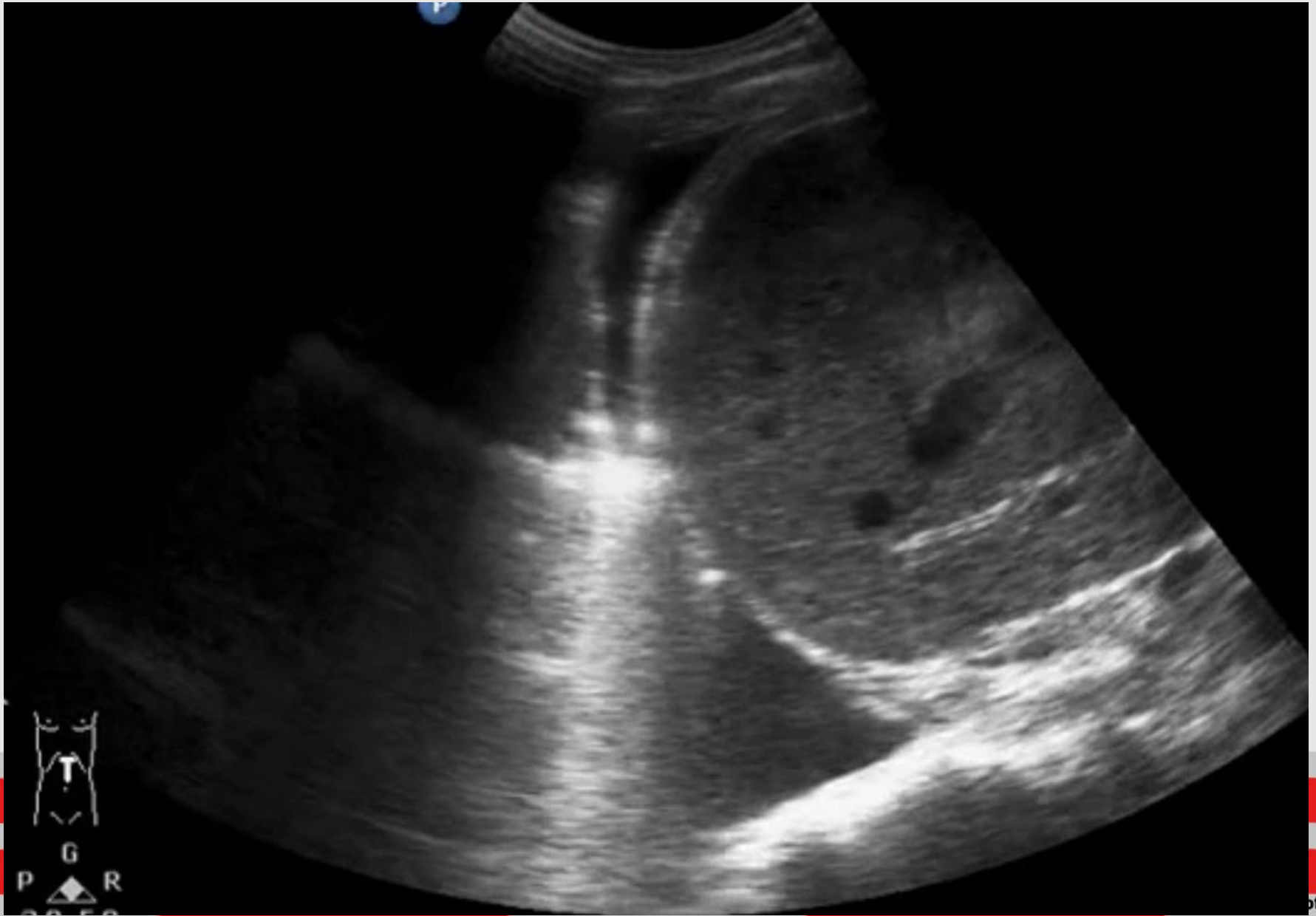
Lung U/S



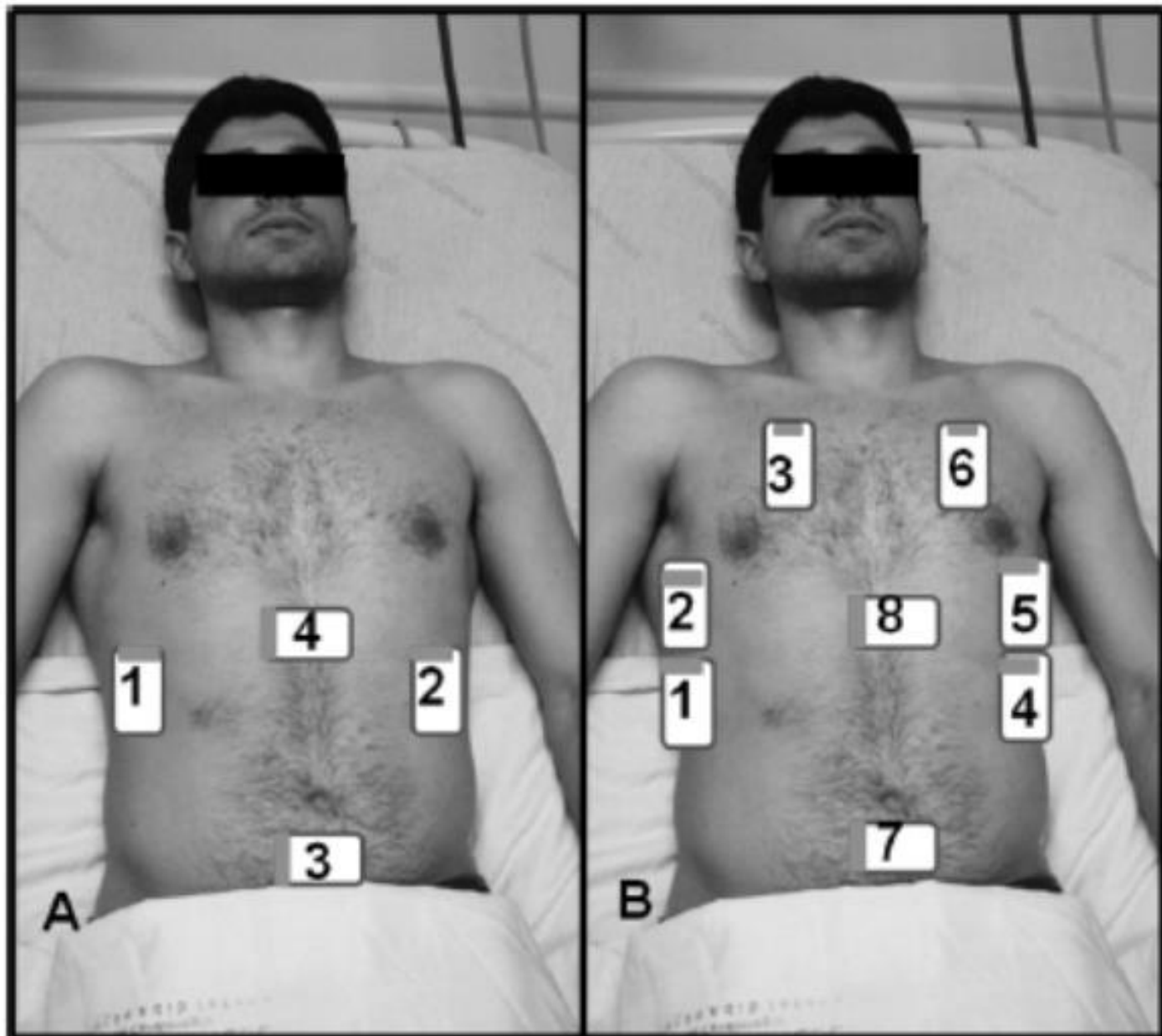
Lung U/S



Lung U/S



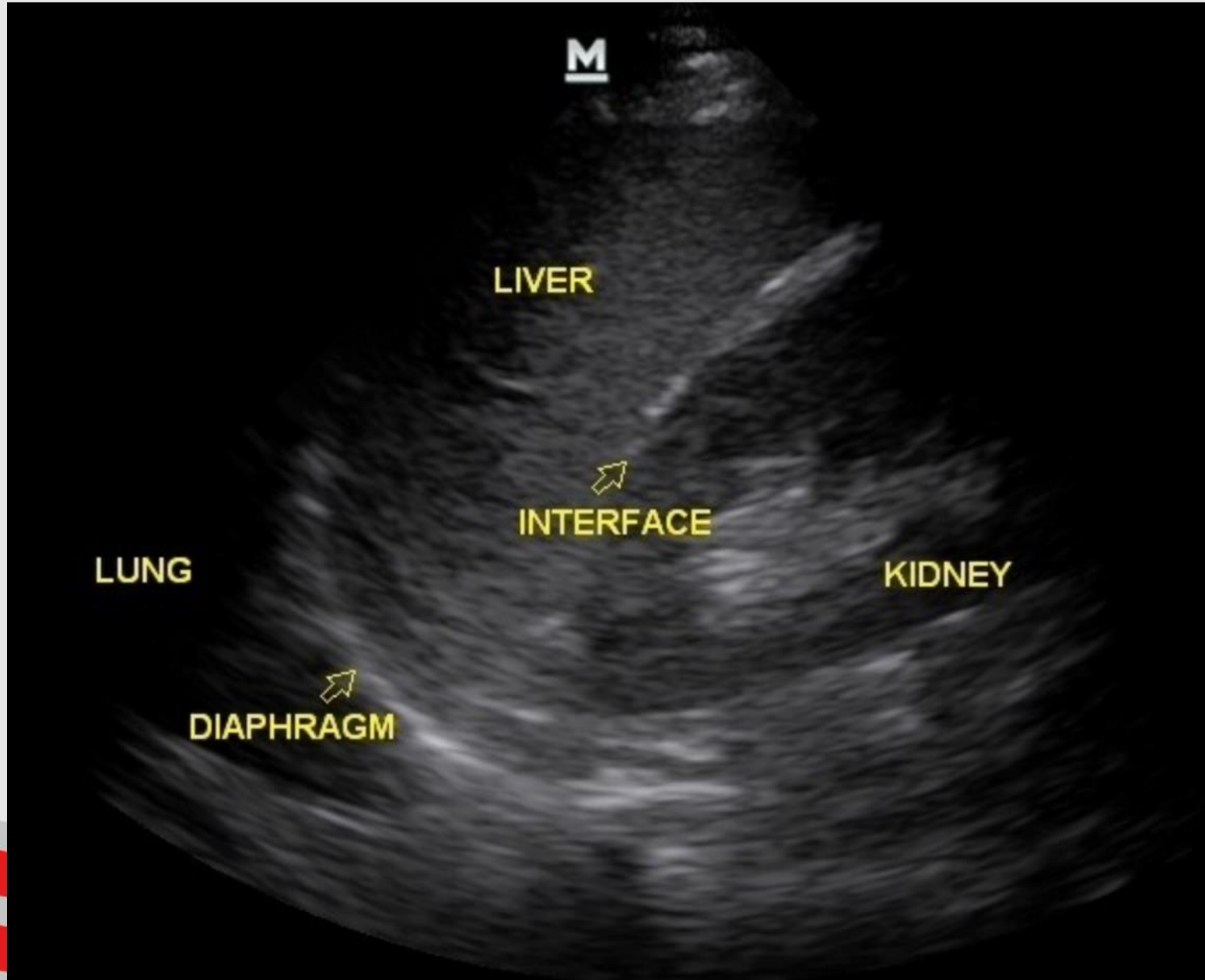
FAST/E-FAST exam



Morrison's Pouch



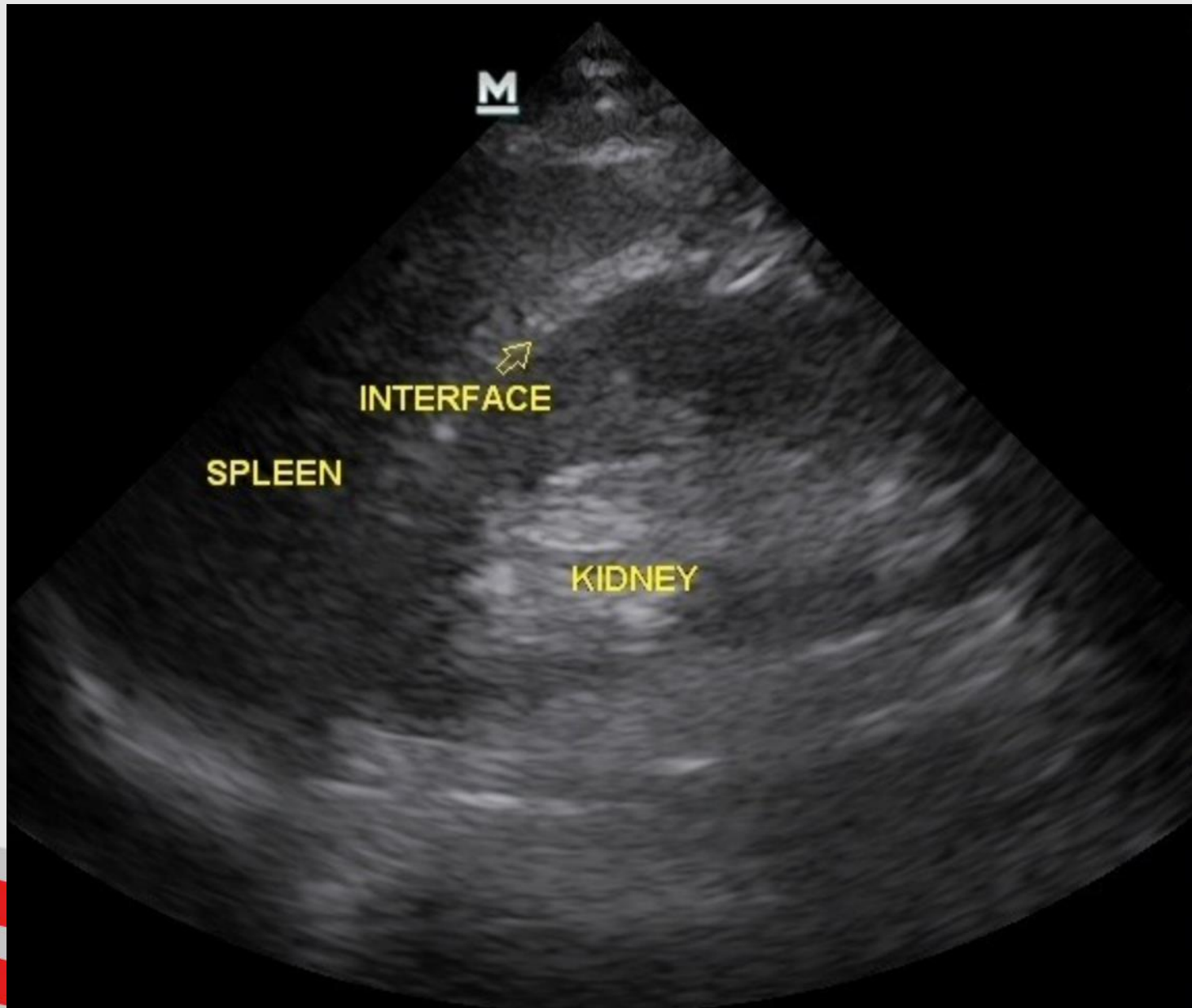
Morrison's Pouch



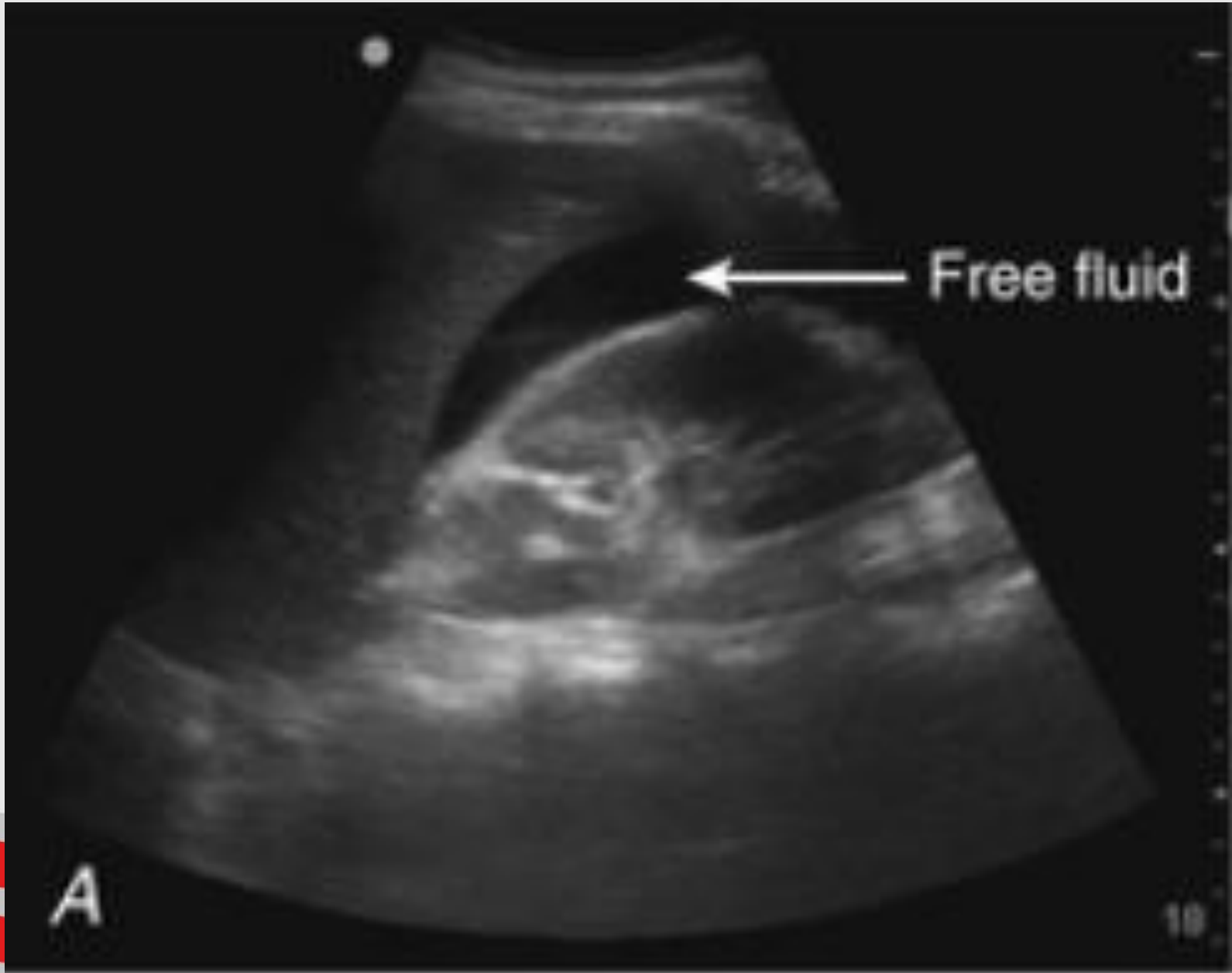
Spleno-renal recess



Spleno-renal recess



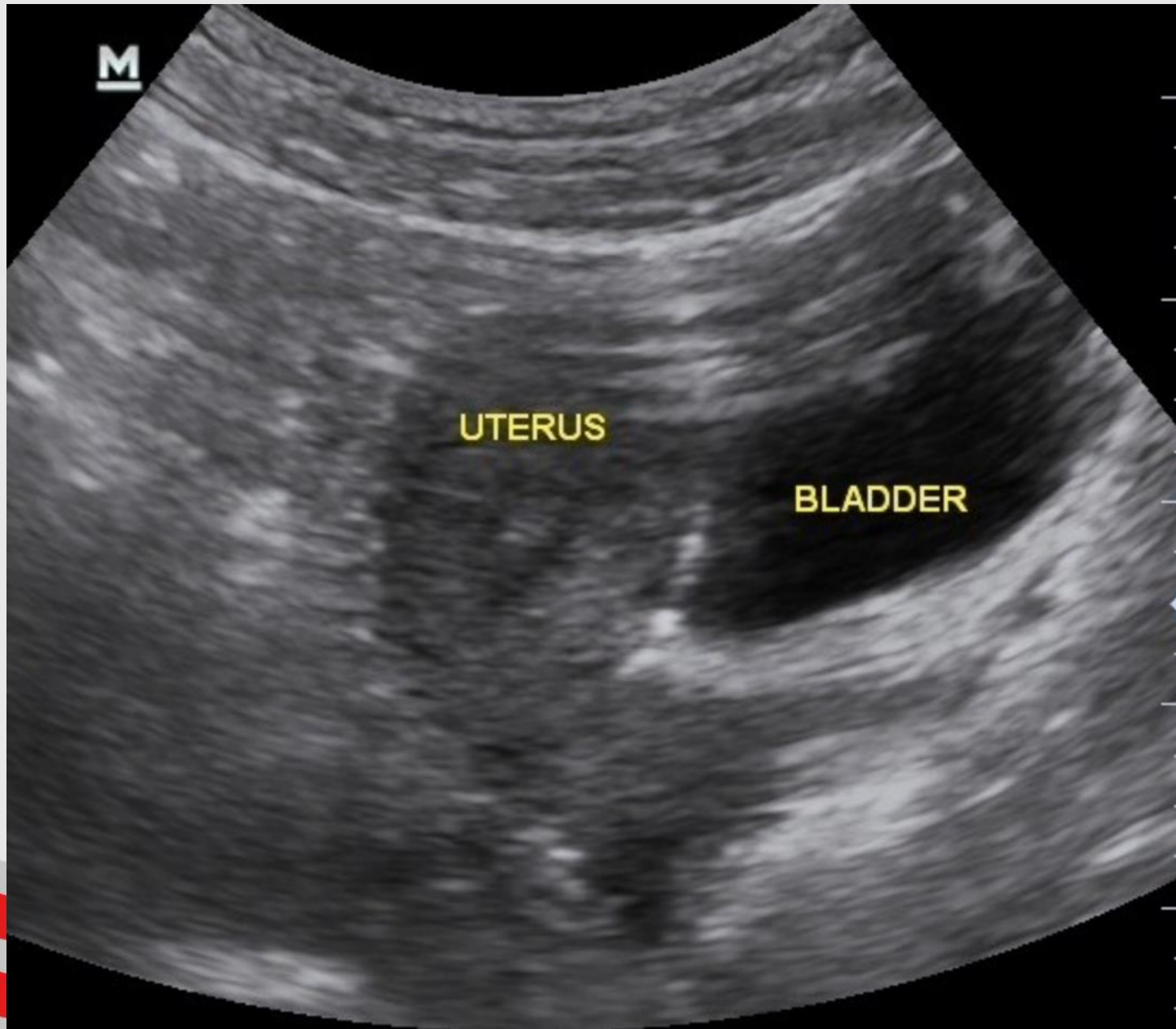
Positive RUQ



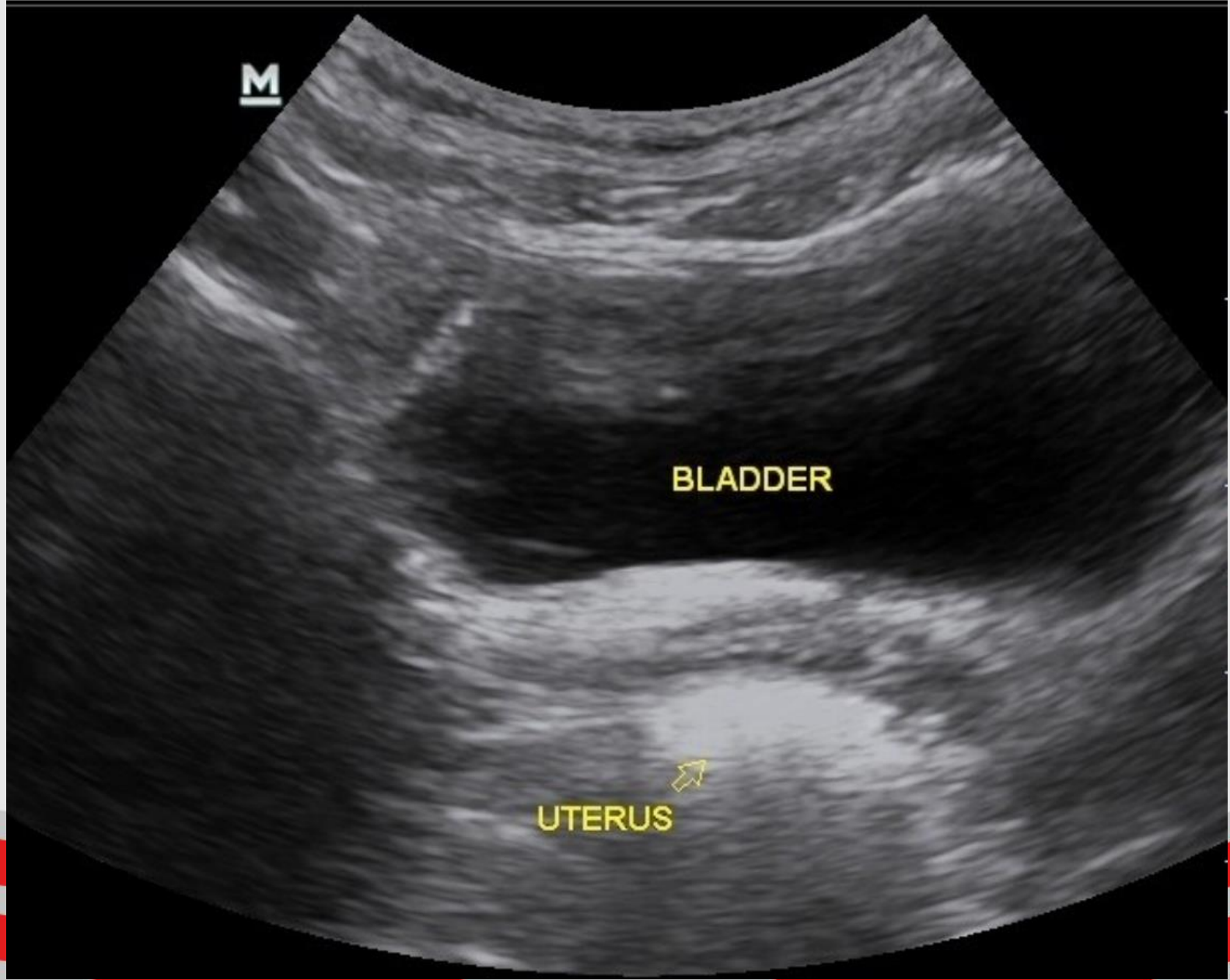
Pelvis



Pelvis



Pelvis



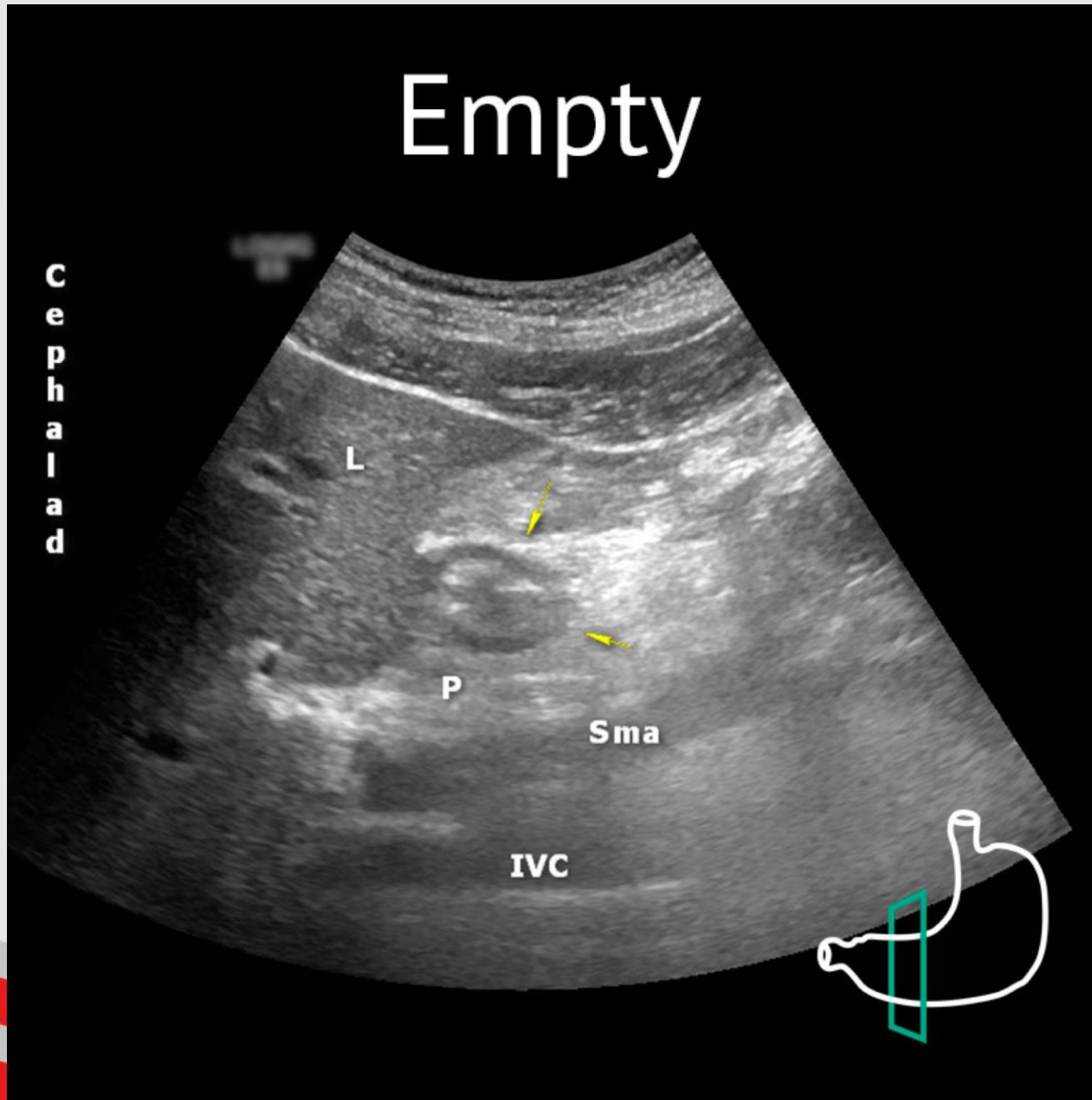
Pelvis



Gastric

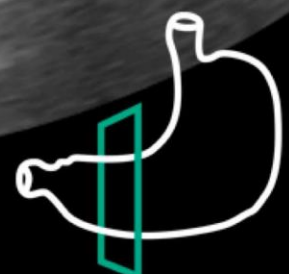
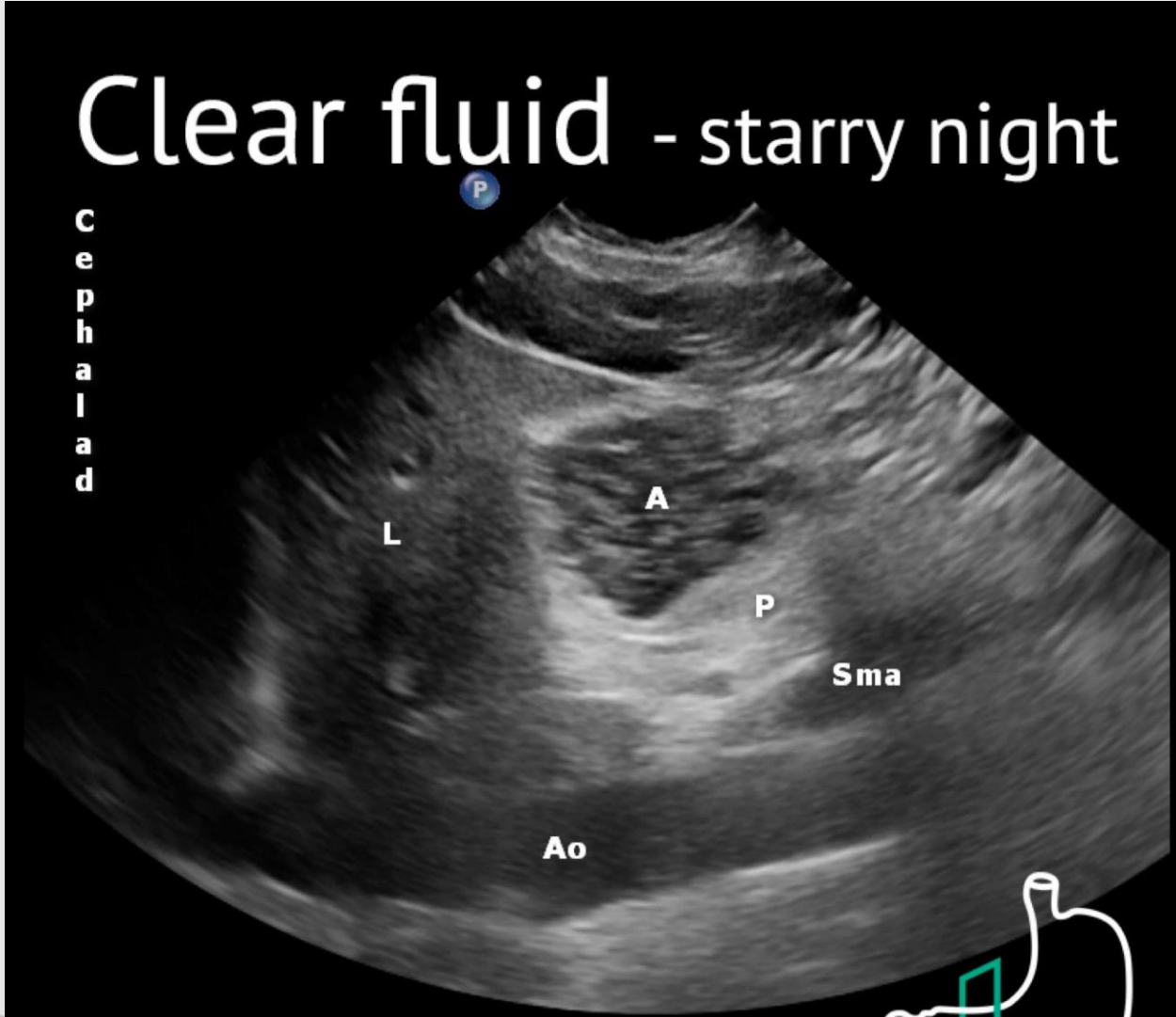


Gastric Empty



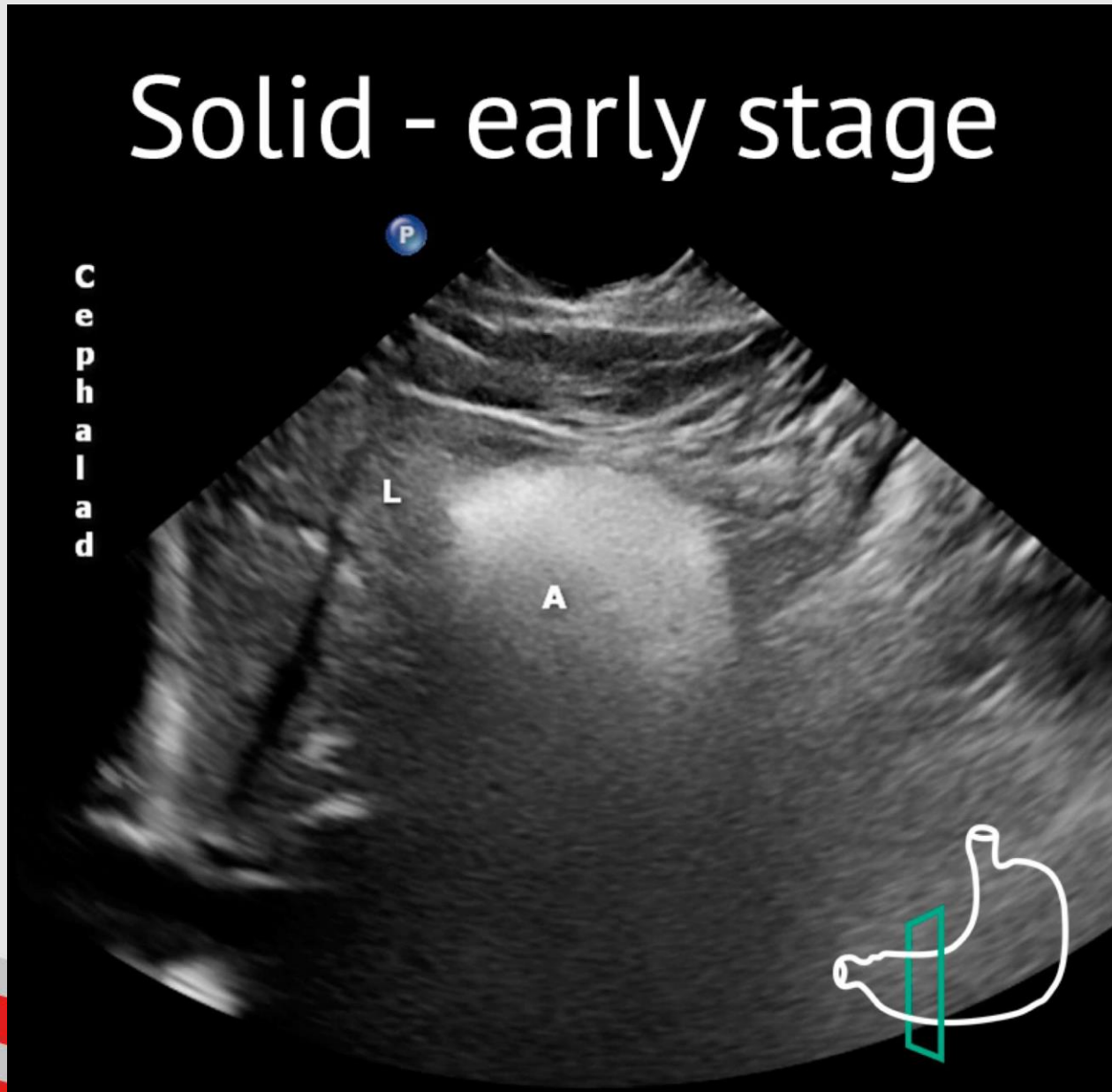
Gastric

Clear fluid - starry night

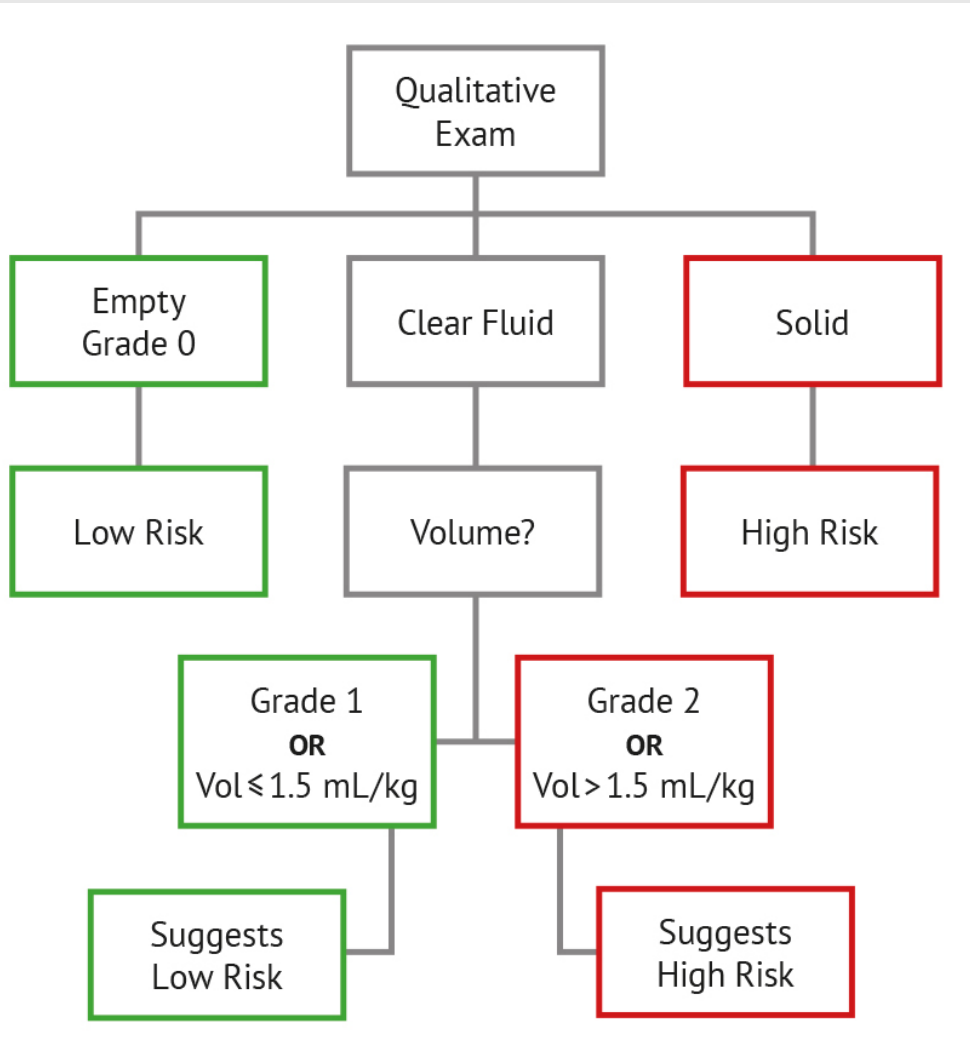


Gastric

Solid - early stage

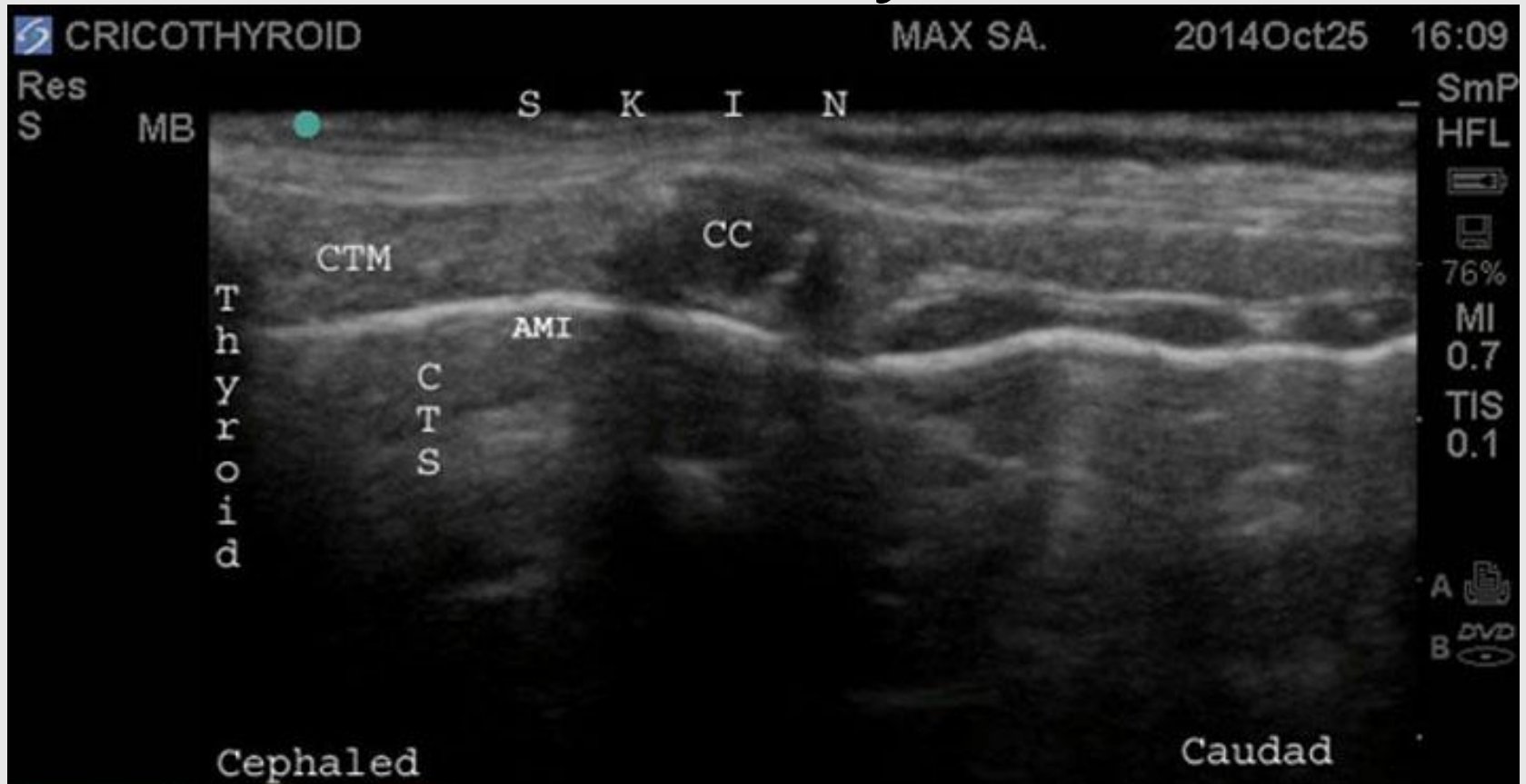


Gastric



| | Right lat CSA (cm ²) | Age(y) | | | | | |
|----|-------------------------------------|--------|-----|-----|-----|-----|-----|
| | | 20 | 30 | 40 | 50 | 60 | 70 |
| 2 | 31 | 18 | 5 | 0 | 0 | 0 | 0 |
| 3 | 45 | 32 | 20 | 7 | 0 | 0 | 0 |
| 4 | 60 | 47 | 34 | 21 | 9 | 0 | 0 |
| 5 | 74 | 62 | 49 | 36 | 23 | 10 | 0 |
| 6 | 89 | 76 | 63 | 51 | 38 | 25 | 12 |
| 7 | 103 | 91 | 78 | 65 | 52 | 40 | 27 |
| 8 | 118 | 105 | 93 | 80 | 67 | 54 | 41 |
| 9 | 133 | 120 | 107 | 94 | 82 | 69 | 56 |
| 10 | 147 | 135 | 122 | 109 | 96 | 83 | 71 |
| 11 | 162 | 149 | 136 | 123 | 111 | 98 | 85 |
| 12 | 177 | 164 | 151 | 138 | 125 | 113 | 100 |
| 13 | 191 | 178 | 165 | 153 | 140 | 127 | 114 |
| 14 | 206 | 193 | 180 | 167 | 155 | 142 | 129 |
| 15 | 220 | 207 | 194 | 182 | 169 | 156 | 143 |
| 16 | 235 | 222 | 209 | 200 | 184 | 171 | 158 |
| 17 | 249 | 236 | 224 | 211 | 198 | 185 | 173 |
| 18 | 264 | 251 | 239 | 226 | 213 | 200 | 187 |
| 19 | 278 | 266 | 253 | 240 | 227 | 214 | 202 |
| 20 | 293 | 281 | 268 | 255 | 242 | 229 | 217 |
| 21 | 307 | 295 | 282 | 269 | 256 | 244 | 231 |
| 22 | 323 | 310 | 297 | 284 | 271 | 259 | 246 |
| 23 | 337 | 324 | 311 | 298 | 285 | 273 | 260 |
| 24 | 352 | 339 | 326 | 313 | 301 | 288 | 275 |
| 25 | 366 | 353 | 340 | 327 | 315 | 302 | 289 |
| 26 | 381 | 368 | 355 | 343 | 330 | 317 | 304 |
| 27 | 395 | 382 | 369 | 357 | 344 | 331 | 318 |
| 28 | 410 | 397 | 385 | 372 | 359 | 346 | 333 |
| 29 | 424 | 411 | 398 | 386 | 373 | 360 | 347 |
| 30 | 439 | 427 | 414 | 401 | 388 | 375 | 363 |

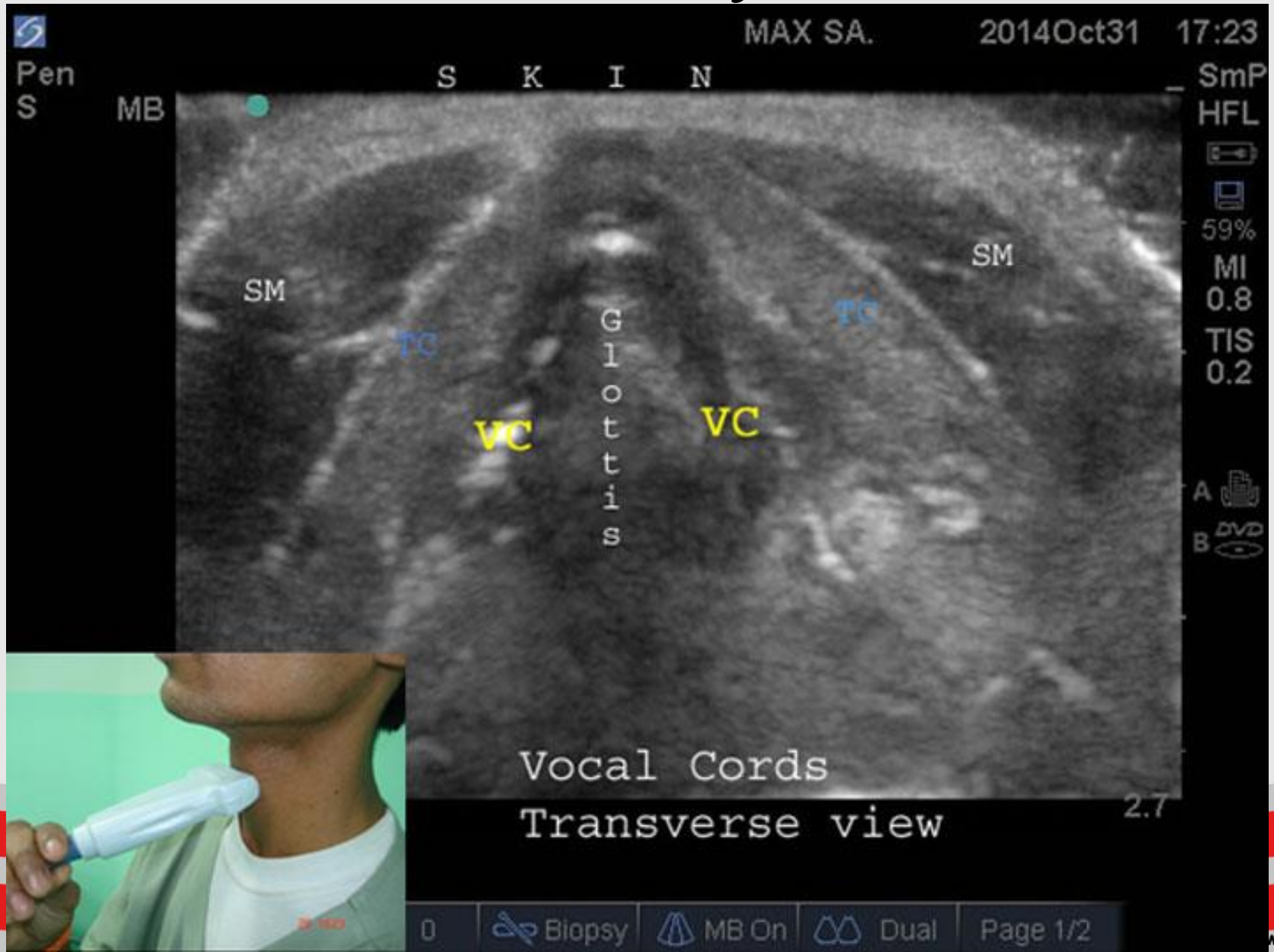
Airway



Cricoid cartilage
Cricothyroid membrane

2.7

Airway



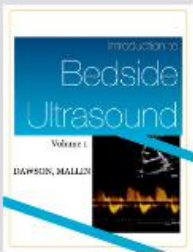
Airway



References



Comprehensive Critical Care Ultrasound



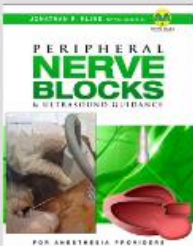
Introduction to Bedside Ultrasound: Volume 1
Matthew Dawson & Mike Mallin

Medical



Introduction to Bedside Ultrasound: Volume 2
Mike Mallin & Matthew Dawson

Medical



Peripheral Nerve Blocks and Ultrasound Guidanc...
Jonathan P. Kline, CRNA, M.S.N.A.

Medical